HIGH RESOLUTION LABORATORY CROSS SECTIONS IN SUPPORT OF HST SOLAR SYSTEM OBSERVATIONS

GHRS and STIS have been observing the Jovian planets and ISM at high spectral resolution. To keep pace with these measurements and required modeling we have developed a laboratory program to provide electron impact collision cross sections of the major molecular planetary and interstellar gases. Spectra under optically thin conditions have been measured with a high resolution UV spectrometer in tandem with electron impact collision chamber. High resolution spectra and cross sections of the Rydberg band systems of H2 and the line profiles of H Lyman-a, b have been obtained. A new high resolution spectral model suitable for modeling excitation of H2 by an arbitrary secondary electron ditribution function in the aurora of the Jovian planets is being developed. Electron impact dissociation of H2 is believed to be one of the major mechanisms leading to the observed wide profile. The kinetic energy distribution of H(2p) atoms resulting from electron impact dissociation of H2 has been measured. Follow-on studies of atomic fragments from N2 and SO2 indicate substantial energy release of kinetic energy (1-10 eV). We report a quantitative measurement of the temperature dependent predissociation fraction in the N2 c' v'=0,3,4 vibrational levels with an experimental determination of rotational line strengths. We report the first study of H La, b from atomic H into the high energy range . A model of the 2p, 3p excitation of the most abundant species is developed to include direct excitation, cascade and resonances.